

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference Verax/IJW | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/SE2002/002448 | International filing date (day/month/year) 20.12.2002 | Priority date (day/month/year) 28.12.2001 |
| International Patent Classification (IPC) or national classification and IPC F16L 23/032 | | |
| Applicant VERAX Engineering AB et al | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:

| | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

| | |
|---|---|
| Date of submission of the demand 21.07.2003 | Date of completion of this report 08.03.2004 |
| Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88 | Authorized officer Malin Hallmén / MRO Telephone No. +46 8 782 25 00 |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2002/002448

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☒ This report is based on a translation from the original language into the following language English, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☒ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1 - 8 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 1 - 3 received by this Authority on 11.01.2004
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1 - 2 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2002/002448

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|-------------|-----|
| Novelty (N) | Claims | <u>1-13</u> | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | <u>1-13</u> | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | <u>1-13</u> | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

Cited documents in the International Search Report:

D1: WO9010812 A1

D2: US2940779 A

D3: US 4183562 A

D4: WO 9317268 A1

Document D1 discloses a flange ring for making joints between axially consecutive component parts of hollow fabrication such as gas turbine aero casings. The claimed invention differs from the cited document D1 in that the flange end surface is slightly concave in the radial direction in an *unstressed condition*.

Document D2 discloses a flange connection where one of the flanges has a frustoconical end surface. The claimed invention differs from the cited document D2 in that the flange end surface is slightly concave in the radial direction.

The flange member and flange joint defined in claims 1-13 are not disclosed in any of the documents D1-D4. None of the cited documents D1-D4 gives any indication that would lead towards the claimed flange member and flange joint according to claim 1-13. No relevant combination of the cited documents would lead a person ordinary skilled in the art to the invention defined in claims 1-13. Therefore, the invention according to these claims is not considered obvious to a person skilled in the art.

Accordingly, the flange member and flange joint defined in claim 1-13 are novel and are considered to involve an inventive step. The flange member and flange joint are industrial applicable.

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AMENDED CLAIMS

1. Flanged member, intended to be included as a first component in a flanged joint, for installation in a pressure equipment device, and having a first
5 flanged end with a first end surface intended to be assembled together with another end surface of a flanged end on another, second flanged member constituting a second component in said flanged joint, **characterized** in that said first end surface, in unstressed condition, is slightly concave in the radial direction over at least a part of the extension thereof in the radial direction.
- 10 2. Flanged member according to claim 1, **characterized** in that said first end surface is concave over the entire extension thereof in the radial direction.
3. Flanged member according to claim 1, **characterized** in that said first end
15 surface is concave in the radial direction over at least an area that is foreseen to be the area that essentially will be subjected to deforming forces when the flanged member is assembled together with another flanged member as well as during use.
- 20 4. Flanged member according to claim 1, **characterized** in that said first end surface is concave in the radial direction over essentially that area which, during use, is foreseen to constitute contact surface against the corresponding end surface of said second flanged member.
- 25 5. Flanged member according to claim 1, **characterized** in that said first end surface comprises more than one concave part surface in the radial direction and that said part surfaces may have different radii of curvature.
- 30 6. Flanged member according to any one of the preceding claims, **characterized** in that it has an internal, through, axial opening and that said first end surface has an innermost abutment point against the corresponding end surface of said second flanged member, which abutment point is situated farthest in the radial direction, at said opening, as well as that the concavity of the first end surface extends all the way in to said abutment point.

7. Flanged member according to any one of claims 1–5, **characterized** in that said first end surface has an innermost abutment point against the corresponding end surface of said second flanged member, which has an internal, through, axial opening, and that said innermost abutment point is situated farthest in in the radial direction, at said opening, as well as that the concavity of the first end surface extends all the way in to said abutment point.

8. Flanged member according to any one of claims 1–7, **characterized** in that a conceived straight line X that connects the innermost point a of said first end surface, in the radial direction, with the outermost point b thereof, in the radial direction, has a length L_x and that the concavity of the end surface has a maximum depth D_k in relation to a conceived plane surface produced by said line X, which depth D_k is of the order of 0,01 %–2 % of L_x .

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9. Flanged member according to any one of the preceding claims, **characterized** in that said first end surface is inclined in the radial direction outwards and away from a conceived opposite end surface.

10. Flanged member according to any one of the preceding claims, **characterized** in that at least a part of a transition area, between the surface of the flange directed away from said end surface and a part of the flanged member that is substantially parallel to the longitudinal axis of the member, is shaped as a substantially elliptical area.

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11. Joint, comprising two joint halves in the form of two flanged members and included in a pressure equipment device, which members have at least one flanged end each having an end surface, and which members are assembled together via their end surfaces of said flanged ends, which surfaces are facing each other, **characterized** in that at least one of said flanged members is designed in accordance with any one of claims 1–10.

12. Joint according to claim 11, **characterized** in that both of the flanged members are designed in accordance with any one of claims 1–10.

13. Joint according to any one of claims 11–12, **characterized** in that said end surfaces facing each other are inclined in the radial direction outwards so that they, in radial cross-section, form an angle to each other, when they have been
- 5 brought together but before assembly, which is such that the distance between the two end surfaces increases in the radial direction outwards, and at least one of said inclined end surfaces being slightly concave.
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